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UNCLASSIFIED INFORMATION ON SOVIET
BLOC INTERNATIONAL GEOPHYSICAL COOPERATION
-1960

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INFORMATION ON SOVIET BLOC INTERNATIONAL GEOPHYSICAL COOPERATION - 1960

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INFORMATION ON INTERNATIONAL GEOPHYSICAL COOPERATION --

SOVIET-BLOC ACTIVITIES

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I. ROCKETS AND ARTIFICIAL EARTH SATELLITES

Academician Blagonravov Hedges on Predicting Date for "Man into Space"

A brief article written by Academician Blagonravov has appeared in a recent issue of the popular Soviet science publication Nauka i Zhizn' in which he states, in substance:

However perfect automatic systems may be, they cannot match the human brain. That is why it is of extraordinary scientific importance to put a man into space.

It is now difficult to state exactly when the first man will travel into space, but it is not a matter of the unforeseeable future. ("Flight of Man into Space Not in the Unforeseeable Future," by Academician A. Blagonravov, Nauka i Zhizn', No. 6, 1960)

Soviet Scientist Reviews the Immediate Past, Present and Future of Space Technology and Exploration

Nauka i Zhizn', a popular-science journal published in the Soviet Union, carries a five-page article in its June 1960 issue which presents the entire picture of space technology and exploration in a single broad-brush treatment. Although introducing no additional information, concepts, or viewpoints, it nevertheless represents a cogent presentation of current Soviet thought on the "space age". ("Success and Problems of Science", by M. G. Kroshkin, Nauka i Zhizn', No. 6, June 1960, pp. 5-10)

Important Book "By Rocket to the Moon" Published in USSR

V. I. Levantovskiy is the author of a significant 379-page book entitled "By Rocket to the Moon" (Raketoy k lune), published in 1960 by the State Publishing House for Physical-Mathematical Literature in Moscow. The attractive book was printed in 15,000 copies and sells for 9 rubles 45 kopecks. There are 146 splendid diagrams and photographs, plus many additional plates.

The book discusses a variety of problems associated with flights to the moon and also the principal theoretical problems that are of general importance for astronautics.

After setting forth the principles of rocket technology and the elements of celestial mechanics necessary for comprehending the laws of motion of rockets in outer space, the author makes a detailed examination of the various classes of trajectories for flight to the moon (hitting the moon, flying around the moon, etc.); methods for launching artificial satellites of the moon and their possible orbits; flight from the earth and landing on the moon; flight from the moon and landing on the earth; outlook for development of rocket technology and the use of interplanetary stations; the possibilities of automatic rockets and problems of penetration by man into outer space; outlook from the use

of atomic and solar energy in rocket motors; unusual trajectories; advantages and disadvantages of so-called rockets with continual thrust (ion, plasma, etc.); secrets of the moon and astronomical methods for exploration of the same; flights to Venus and Mars and the use of artificial planets -- this is but a by far incomplete listing of the problems discussed in the book.

The book extensively treats problems associated with the historic flights of the first three cosmic rockets and gives details concerning the launching of the American cosmic rockets.

The book is written at a modern scientific level. It will be of interest to all who are seriously interested in the principles of astronautics as a science and in the past attainments and future outlook in the field of space mastery.

The book is written in a popular form, but at the same time it requires attentive and thoughtful reading. ("By Rocket to the Moon", by V. I. Levantovskiy, State Publishing House for Physical-Mathematical Literature, Moscow, 1960)

II. UPPER ATMOSPHERE

Soviet Scientists Comment on Possibility of Extraterrestrial Life

A recent article in the popular Soviet publication Tekhnika-Molodezhi carries the views of a number of Soviet scientists on the possibilities of life in other parts of the universe. Their comments, in summarized form, are as follows:

V. Alpatov, Doctor of Biological Sciences -- Life in terrestrial forms can exist only within rather limited environments. In respect to temperature, only microbes in the spore stage can withstand temperature variations from -272° to approximately $+100^{\circ}$. The presence of water in the environment is also necessary, but oxygen is not. Since Venus is younger than the earth life may only be developing on that planet now. Life on Mars probably consists only of lower organisms. Approximate computations indicate that there are a hundred million planets within the reaches of the universe. It is extremely probable that some of these are at the same stage of development as the earth and life there may be similar to that on our planet.

Professor B. Vorontsova-Vel'yaminova -- The high adaptability of organisms means that we may assume the existence of very simple forms of life in the form of bacteria or spores even on planets with such severe physical conditions as Jupiter and Saturn. It seems highly unlikely that higher forms of life could arise in the solar system even on Mars. Only an exceedingly small number of planets in the universe would be suitable for the development of higher forms of life, but there are such vast numbers of planets that there must be many suitable for such development.

G. Tikhov, Corresponding Member of the Academy of Sciences of the USSR -- Man has been on earth for such a relatively short period of time that we must assume that after the passage of several million years more he will be a more perfect individual in both physical and mental respects than he is now. Life on other planets may be either of a higher or a lower type than on the earth. The problem of life on other worlds is the province of a new and important science -- cosmobiology.

N. Shirov, Doctor of Technical Sciences -- It may be assumed that Martians would only require 40% of the oxygen content we have in our atmosphere. The dark "seas" on Mars are evidently oxygen "factories" which replenish the natural loss of oxygen by photosynthesis. Because of the unique character of the vegetation, subject to a diurnal range of 60°-70°, the oxygen content in the atmosphere of Mars would be variable, rising toward the end of the day and sharply dropping toward morning.

The atmosphere of Mars contains a large percentage of heavy gases -- especially argon, krypton and xenon. Of course, with the present state of technology it is impossible to qualitatively confirm the presence of such gases. Shirov feels that there is indirect evidence pointing to the predominance of heavy inert gases in the atmosphere of Mars: the pronounced occurrence of dust storms on that planet and the long time required for this dust to settle. A possible source for these heavy inert gases is the radioactive decay of potassium and rubidium.

A. Imshenetskiy, Corresponding Member of the Academy of Sciences of the USSR, Director of the Institute of Microbiology -- One of the important problems facing microbiology is to find out whether there is an upper boundary to the earth's biosphere. Research on stratostats has shown that microorganisms are present at heights of 22 km. Do they exist farther aloft? Do they move under the influence of pressure exerted by light? Can they exist in outer space? Are there microorganisms on the moon and on other heavenly bodies? These are questions that need to be answered. In addition, microbiology requires the design of instruments to detect lower organisms, take samples, and study cosmic dust from the microbiological point of view. ("Life Around the Sun", Tekhnika-Melodezhi, No. 2, 1960, pp. 31-32)

III. OCEANOGRAPHY

Latest News from the Research Vessel "A. I. Voyeykov"

The following is the full translation of a recent article appearing in Izvestiya:

The ocean is unfriendly. The weather is overcast and cool. There are mists by day and they surround the ship at night. It is only occasionally, at mid-day, that the rays of the sun are able to make their way through the shroud of clouds. The temperature of the air and water vary in a range of 15 degrees. This despite the fact that we are to the south

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of Sochi and Yalta. The warm moist air from the south moves onto the cold surface of the ocean, cools, and is then transformed into a stable stratum which not even the wind will disperse.

This is the nature of the summer at sea along the 42d parallel. We have not encountered a single ship during the last ten days although our radar has occasionally picked up distant ships on the horizon. We are accompanied by stormy petrels. They soar smoothly over the surface of the waves, almost touching them with their long narrow wings; from time to time they land on the water.

Scientific observations are continuing. We have made hydro-meteorological soundings of the ocean and atmosphere as we have travelled 2,000 km along the 42d parallel; we are now drifting in a small area of the ocean in order to investigate the changeability of the atmosphere and ocean at various altitudes and depths. The atmosphere is sounded to heights of 30 to 45 km, the ocean to depths of 5 km. The scientists, engineers and technicians work on shifts and are conducting observations twenty-four hours a day. Our hydrochemists, for example, have already made over 5,000 analyses of ocean water.

The crew of the "Voyevkov" and the staff of the expedition are getting along well with one another. A number of proposals for the rationalization of work have already been made; these proposals have made our work easier and have substantially improved the results of observations.

The radio operators Tret'yak and Vasil'yev have established direct communication with our sister ship "Ya. M. Shokal'skiy", which is now in the Indian Ocean.

(signed) G. Ivanov, Candidate in
Technical Sciences, Aboard the
research vessel "A. I. Voyevkov"

("Along the 42d Parallel", by G. Ivanov, Izvestiya, 5 August 1960, p. 5)

IV. GLACIOLOGY

Summary of an Article on the Glaciers of the Polar Urals

A recent issue of the Soviet periodical Nauka i Zhizn' contains a moderately lengthy and highly interesting article on glacial activity in the Polar Urals.

The article pinpoints the location of the Bol'shaya Khadata Glaciological Station of the Institute of Geography of the Academy of Sciences of the USSR; it is on the Bol'shaya Khadata River, high in the Murun-Ken Range. Once isolated, it is now connected to the railway by a rough road.

To be sure, of the 14,000 square kilometers of glaciers in the USSR, only 8 km are found in the Polar Urals. But the reasons for the formation of glaciers there has remained unclear -- that is why a research station was established there in the summer of 1956.

Much of the article is devoted to details of finding a site for the station and building the necessary structures. Only a limited amount of geological or topographic information is contained in these paragraphs.

The base was actually ready only in mid-1957. The article contains a popular account of the glaciological, meteorological, actinometric, and associated research customary for such stations. The stress is on the physical difficulties endured by the workers as a result of the severity of the climate and terrain.

Since establishment the staff and program have continually expanded. The principal interest is the Institute of Geography Glacier, but observations are being made at two other nearby glaciers. The staff now numbers seventeen men. There are three meteorological stations -- at the foot of the glacier, in the firn zone, and on the plateau.

It is now clear that the Polar Ural glaciers exist due to the accumulation of immense quantities of snow during the winter season in the upper part of the glacier, in the firn zone. These accumulations result not so much from precipitation freely falling from the atmosphere but from snow blown there by the constant westerly winds from the adjoining plateaus. All this snow cannot melt away in the summer although the thaw rate there, at 67° N., is as great as in the Caucasus or Central Asia -- 4-6 cm a day. Solar radiation is not the factor primarily responsible for the thawing of the glaciers of the Polar Urals -- rather, it is the warmth of the air masses carried by the constant westerly winds and the warmth liberated during the almost constant condensation of water vapor.

The article contains no maps or photographs.
("The Bol'shaya Khadata Station", by R. Yu. Veniyeri, Chief of the Polar Ural Expedition of the Institute of Geography of the Academy of Sciences of the USSR, Nauka i Zhizn', No. 6, 1960, pp. 56-59)

Fedchenko Glacier

Following is a summary of an article by V. F. Suslov, assistant chief of the expedition of the Uzbek Academy of Sciences, in the Ukrainian-language journal Nauka i zhyttia (Science and Life), Vol. X, No. 6, June 1960, pp. 56-58.

Fedchenko Glacier is an enormous field of ice 70 kilometers long and up to 1 kilometer thick and 4 kilometers wide in the Pamir Mountains at the headwaters of the Muksu River. Discovered in 1878, it was first studied in the Second Polar Year (1932-1933) when a meteorological station was set up at the center of the glacier. This station is still functioning.

In connection with a world-wide study of glaciological processes during the IGY, the Uzbek Academy of Sciences organized research on the glacier with the participation of Russian, East German, Polish and Chinese scientists. Stations set up at 5000 meters above sea level and at 3000 meters near the tongue of the glacier. Scientists spent 800 days in the area.

Tens of new glaciers discovered in the area and a map was compiled showing Pamir glaciation (new glaciers: Academy of Science of the Uzbek SSR, Korotkayev, Kosinenko, Shcherbakov, Ulugbek, and others). Despite a general decrease in the ice bulk of the entire basin (as throughout the world) some glaciers had actually increased in size in recent years (Diyachnyy Glacier, center of Fedchenko Glacier, Ulugbek Glacier).

Fedchenko Glacier was 150 kilometers long at its paleogeographical maximum. Seismic studies showed a present depth of 1000 meters atop an 800-meter layer of debris. The glacier contains 170 billion cubic meters of ice, an enormous water power reserve. The greatest movement is 112 centimeters per 24 hours at the center, decreasing upward to 20-30 centimeters per day at the top. This would indicate that 180 years would be needed for total replacement.

Greatest melting was found to take place in overcast weather with great precipitation. Year-round average temperature was -12°C with a snowfall of 4.5 meters at 5000 meters above sea level. ("Fedchenko Glacier", by V. F. Suslov, Nauk i zhyttia, Vol X, No. 6, June 1960, pp 56-58.)

V. ARCTIC AND ANTARCTIC

The Contribution of Russian Aviators to Soviet Antarctic Research

The following is the full text of a tribute paid to Soviet airmen in Antarctica. It is from the pages of Civil Aviation (Grazhdanskaya Aviatsiya).

Five consecutive expeditions of the Academy of Sciences of the USSR have now worked in Antarctica. Airmen of the polar aviation service have been faithful and reliable assistants to the scientists of the expeditions in the course of this difficult work. The commander of the detachment is the well known pilot Aleksandr Pimenov.

We have communicated by radio with Mirnyy, the base of the Fifth Soviet Scientific Expedition. The base is under the command of Ye. S. Korotkevich, Candidate in Geographical Sciences. The following are the answers which Comrade Korotkevich gave our correspondent.

Q. What are the problems of the Antarctic Expedition following the conclusion of the International Geophysical Year?

A. The International Geophysical Year has ended but the study of Antarctica within the framework of scientific cooperation among twelve different nations is continuing. At the end of last year a conference was held in Washington which was attended by the representatives of these countries. They decided to forbid the establishment of military bases in Antarctica and to ban all measures of a military character. The coldest continent of the earth has become the warmest in respect to cooperation among the scientists of many countries. A wonderful example for other continents!

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The Antarctic Scientific Expedition of the Academy of Sciences of the USSR, together with the polar aviation detachment of the Civil Air Fleet, is conducting glaciogeographic and geophysical research in the interior part of Eastern Antarctica; the nature of the ice in the coastal regions is being studied, especially in the mountainous system of Queen Maud Land.

Q. How do the airmen assist you in the conduct of scientific research in Antarctica?

A. It would be impossible to conduct scientific research here at the scale at which it is proceeding were it not for air support.

It may be said without exaggeration that the detachment, consisting of pilots, navigators, mechanics, and radiomen, having flown millions of kilometers over the expanses of the Arctic Ocean, is a reliable support to our operations. The detachment, commanded by A. Pimenov, insures the normal activity of interior scientific stations, forms a link between the Mirnyy Observatory and the scientific station Lazarev, delivers supplies to our other bases (instruments, fuel, foodstuffs), executes aerial photography, and performs ice reconnaissance.

The aircraft of the detachment have flown more than 1,000 hours, delivering food and fuel to the stations of Vostok and Komsomol'skaya. A. Pimenov, the detachment commander, made a non-stop flight in an Il-14 aircraft from Lazarev to Mirnyy. The pilot A. Barabanov covered the same route in an Il-2 under difficult meteorological conditions.

The pilot A. Safonov, the mechanic F. Kovalenko, and the radioman I. Ozerov, delivered 193 barrels of aviation gasoline from the diesel-electric vessel "Ob'" to the Japanese station Showa and the Australian base Mawson. The fuel was intended for the refueling of our aircraft making flights between Mirnyy and Lazarev.

An An-2 aircraft transferred 23 tons of food to Mirnyy settlement from the other diesel-electric vessel "Kooperatsiya".

A. Pimenov's air detachment took aerial photographs of a part of the Lazarev shelf ice. A geological map, based on data from aeromagnetic surveys, was compiled to show a mountainous zone 250 km long and 35 km wide in the northern part of Queen Maud Land.

The aircraft of the detachment were used to effect the changes in personnel at the stations situated in the interior of the continent and deliver freight to them from the main base.

Aeronavigational conditions for flights over the icy expanses of Antarctica are rather complex. This complexity is due to the fact that there are exceedingly few radio and meteorological stations there. Navigators must always plot their courses under unknown conditions. There are mountain ridges here whose peaks rise to an elevation of more than 6,000 meters above sea level. Pilots must take off from fields situated at an elevation of 3,500 meters. The climate of the sixth continent is extraordinarily severe. Winds of storm force blow wildly. Intense frosts also make flights difficult. A record low air temperature

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has been observed here -- minus 87.4 degrees Celsius. Air density is considerably lower than in the Northern Hemisphere, while the snow, like sand, will not smooth down and ordinary skis will not slide over it.

All of the experience of the pilots, accumulated during a quarter of a century of flights over the ice of the Arctic, has been put to use in flying under the unusually severe conditions prevailing in the uninhabited sixth continent. Crew commanders A. Barabanov, Yu. Zotov, V. Sysoyev, I. Vechtomov and A. Safonov successfully dealt with the problems they faced.

Other excellent workers included the radiomen P. Boyko and B. Aleksandrovskiy and the mechanics B. Gladkov, A. Mezhevykh and V. Anan'yev. They participated in the past Antarctic expeditions and are now conveying their experience to novices.

Q. Would you tell us what work is to be done by the aviation detachment according to the future plans for scientific investigation by the Soviet Expedition?

A. We intend to replace the staff at Lazarev Station, accomplish a rather extensive program of geological and geographic work in Queen Maud Land, perform aeromagnetic work, and take aerial photographs. None of this can be done without air support. We will also replenish the supplies of food and equipment at the scientific station Vostok, situated in the interior of the continent. We will also provide all that is needed by the sledge-tractor trains which will be making long traverses.

The staff of the Fifth Scientific Expedition is sure that the polar aviation detachment of the CC 1 Air Fleet will overcome all the difficulties standing in its path and will perform with honor the tasks set before it by the beloved fatherland. ("Over the Icy Silence of the Sixth Continent", Grazhdanskaya Aviatsiya, No. 5, May 1960, p. 7).

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